# Survey of Research on Learning Styles

A number of studies conducted during the last decade have found that students' achievement increases when teaching methods match their learning styles—biological and developmental characteristics that affect how they learn.

R esearch on learning styles has been conducted at more than 60 universities over the past decade. These investigations have yielded useful findings about the effects of environmental, emotional, sociological, physiological, and cognitive preferences on the achievement of students. Learning style is a biologically and developmentally imposed set of personal characteristics that make the same teaching method effective for some and ineffective for others.

Every person has a learning style-it's as individual as a signature. Knowing students' learning styles, we can organize classrooms to respond to their individual needs for quiet or sound, bright or soft illumination, warm or cool room temperatures, seating arrangements, mobility, or grouping preferences. We can recognize the patterns in which people tend to concentrate best-alone, with others, with certain types of teachers, or in a combination thereof. We become aware of the senses through which people remember difficult information most easily-by hearing, speaking, seeing, manipulating, writing or notetaking, experiencing, or, again, a combination of these.

Learning style also encompasses motivation, on-task persistence versus the need for multiple assignments simultaneously, the kind and amount of structure required, and conformity versus nonconformity. When a National Association of Secondary School Principals (NASSP) Task Force (1983)

examined all the characteristics that influence student achievement, intake preferences (individual needs for eating) achieved the highest reliability. Chronobiology is also part of style: some people are "morning people"; some are "night owls."

There are only three comprehensive models of learning style (Hill et al. 1971, Keefe et al. 1986, Dunn et al. 1975, 1979, 1981, 1985); others address only one to four elements, usually on a bipolar continuum. Although various scholars define the concept differently, only a few learning style identification instruments are reliable and valid (Curry 1987).

### **Correlational Studies**

To investigate connections between individual preferences and other influences on learning, researchers have conducted correlational studies to establish the relationships between learning style and birth order, cognitive development, maturation, hemisphericity, field dependence/indepenglobal/analytic processing, dence, temperament, and self-concept. Their comparisons examined learners at all levels from primary school through adulthood. They differentiated among gifted, musically and artistically talented, average, underachieving, atrisk, nontraditional, reading-disabled, special education, dropout, and adolescent psychiatric populations. Researchers further tested consistency of style over subject matter and time. In addition, the researchers determined the responsiveness of basal readers to style differences, and they also examined the extent to which teacher training programs complemented their student candidates.

Correlational studies also explored the similarities and differences between and among diverse groups. Thus, researchers developed profiles of the styles of a wide range of learners, including students at various levels of achievement in diverse age groups; gifted, learning disabled, and mentally retarded students; supervisors and their supervisees; teachers and their students; Southeast Asian and American Caucasian college registrants; and numerous other groups. In addition, comparisons were made of the learning styles of Bahamians and Jamaicans; Afro-Americans and Caucasians; and Afro-, Chinese, Greek, and Mexican Americans (Annotated Bibliography 1988; Learning Styles Network Newsletter 1980-1988).

#### Correlations Between Learning Style and Hemisphericity

As new findings about left/right brain functions appeared, researchers investigated the connections between learning style and hemisphericity. The terms *left/right, analytic/global,* and *inductive/deductive* have been used interchangeably in the literature; descriptions of these pairs of variables parallel each other. Lefts/analytics/inductives appear to learn successively, in small steps leading to understanding; rights/globals/deductives more easily learn by obtaining meaning from a broad concept and then focusing on details.

Studies that examined the similarities and differences between hemispheric style and other elements of learning style revealed that, when concentrating on difficult academic material:

1. High school students who were less motivated than their classmates and who preferred working with *distracters* (music, low illumination, informal or casual seating, peers rather than alone or with the teacher, tactile rather than auditory or visual instructional resources) scored right-hemisphere significantly<sup>1</sup> more often than lefthemisphere. Also, students who scored high on persistence invariably scored high as left processors (Dunn et al.

1982). (The latter data may have implications for time-on-task research.)

2. Left-hemisphere youngsters in grades 5-12 preferred a conventional formal classroom seating design, more structure, less intake, and visual rather than tactile or kinesthetic resources during learning significantly more often than their right-preferenced classmates (Cody 1983).

3. Right-hemisphere 5th through 12th graders disliked structure and were not adult motivated but *were* strongly peer motivated. Gifted and highly gifted students were significantly more often right or integrated than left processors (Cody 1983).

4. Right-hemisphere community college adult math underachievers preferred learning with sound and intake. They wanted tactile and kinesthetic instructional resources and mobility significantly more often than their lefthemisphere counterparts, who preferred bright light and a formal design. [When the predominantly right-hemisphere students were taught alternately with both global and analytic lessons, they achieved statistically higher test scores through the global, rather than through the analytic, resources (Bruno 1988).]

Thus, correlational studies revealed sets of traits among students within the same age or grade and among those with similar talents, achievement, and interests. Even when culturally diverse groups were examined, there were as many within-group as between-group differences. Within each family, the parents, their offspring, and the siblings tend to be more different from than similar to each other.

#### **Experimental Research**

These correlational findings prompted

Researcher/Date	Sample	Subject Examined	Element Examined	Significant Effects Achievement Attitudes	
DeGregoris 1986	6th, 7th, 8th graders	Reading comprehension	Kinds of sound needed by sound preferences	+ With moderate talking	Not tested
DellaValle 1984	7th graders	Word recognition memory	Mobility/passivity needs		Not tested
Hodges 1985	7th, 8th graders	Mathematics	Formal/informal design preferences	•	•
Krimsky 1982	4th graders	Reading speed and accuracy	Bright/low lighting preferences	•	Not tested
MacMurren 1985	6th graders	Reading speed and accuracy	Need for intake while learning	•	•
Miller 1985	2nd graders	Reading	Mobility/passivity needs	+	Not tested
Murrain 1983	7th graders	Word recognition/ memory	Temperature preference	0	Not tested
Pizzo	6th graders	Reading	Acoustical preference	+	•
Shea 1983	9th graders	Reading	Formal/informal design preferences	+	Not tested
Stiles 1985	5th graders	Mathematics testing	Formal/informal design preferences	0	Not tested

Note: Price (1980) reported that the older students became, the less they appeared able to adapt to a conventional setting. Thus, design may be far more crucial to secondary students' ability to concentrate than to 4th graders, who may be better able to adjust to this element. Dunn and Griggs (1988) described the importance of design to high schoolers throughout the United States. (+) = significant positive findings at p < .01 or greater; (0) = no differences or slight trend.

Fig. 1. Experimental Research Concerned with Learning Styles and Instructional Environments

researchers to conduct experimental studies to determine the effects of individual learning style on achievement, attitudes, and/or behavior.

#### **On Instructional Environments**

The extent to which classrooms appear either to stimulate or to inhibit learning for students with selected learning style characteristics has been documented in terms of individuals' needs for quiet versus sound, bright or soft lighting, warm or cool temperatures, and formal versus informal seating designs (Dunn 1987, Dunn et al. 1985; see fig. 1). These four elements affect from 10 to 40 percent of students, dependent upon age, gender, hemisphericity, and achievement. For example, the need for sound remains fairly consistent during the elementary school years but increases as adolescence begins and, as that stage passes, appears to return to its previously normal level. The younger children are, the less light they need; but about every five years most children require significantly more light than previously. Boys tend to require more mobility than girls and, thus, find sit-

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ting for any length of time difficult (Price 1980). However, teachers often view negatively the children who squirm in their seats, tap their pencils, complain about the temperature, or become hyperactive (in some cases because of too much illumination).

#### **On Perceptual Preferences**

In addition to the instructional environment, sensory preferences influence the ways in which students learn. Eight studies within the past decade reveal that when youngsters were taught with instructional resources that both matched and mismatched their preferred modalities, they achieved statistically higher test scores in modality-matched, rather than mismatched, treatments (Dunn 1988: see fig. 2). In addition, when children were taught with multisensory resources, but initially through their most preferred modality and then were reinforced through their secondary or tertiary modality, their scores increased even more.

Perceptual preferences affect more than 70 percent of school-age youngsters. High school teachers who have translated their curriculum into electroboards, Flip chutes, multipart task cards, and Pick-A-Holes reported increased achievement and interest when such manipulatives were available for highly tactual students (Dunn and Griggs 1988).

Data from studies conducted before the late '70s concerned with perceptual

Researcher/Date	Sample	Subject Examined	Perceptual Preference Examined	Signifi Achievement	cant Effects Attitude
Carbo 1980	Kindergartners	Vocabulary	Auditory, visual, "other" (tactile)	+	Not tested
Jarsonbeck 1984	4th grade underachievers	Mathematics	Auditory, visual, tactile	+	Not tested
Kroon 1985	9th, 10th graders	Industrial Arts	Auditory, visual, tactile, sequenced	+	Not tested
Martini 1986	7th graders	Science	Auditory, visual, tactile	+	+
Urbschat 1977	1st graders	CVC Trigram Recall	Auditory, visual	+	Not tested
Weinberg 1983	3rd graders	Mathematics	Auditory, visual, tactile	+	Not tested
Wheeler 1980	Learning disabled 2nd graders	Reading	Auditory, visual, tactile, sequenced	+	Not tested
Wheeler 1983	Learning disabled 2nd graders	Reading	Auditory, visual, tactile	+	Not tested

Fig. 2. Experimental Research Concerned with Perceptual Learning Styles

# Learning Styles and Student Diversity

Sue Loper

As a young teacher, I inherited a junior high classroom from a teacher who left in midyear. The students were totally out of control. I made it through the year, but I

I unloaded my feelings of frustration on Margaret Payne, who taught next door. She had a reputation for being able to teach even the worst students. In fact, she often accepted problem students during the year when other teachers could no longer tolerate them. Students liked learning in her class; she made them feel special and

successful. Each time they succeeded, they wanted to try again. Ms. Payne listened to my complaints, made sympathetic sounds, and proceeded to offer practical advice: that I teach my students the way they learned best; in other

words, that I determine my students' preferred learning styles and provide activities to match them. She suggested that I use several methods of presenting material and include a variety of activities-individual and group projects-ranging from the replicative to the highly creative. Ms. Payne understood that different students learn in different ways, while teachers often teach as they have been taught (Dunn and

This was certainly true in my own case. Because I learn well auditorily, I tended to teach in a lecture format. Unfortunately, this tendency shortchanged the visual, kinesthetic, and tactile learners in my classroom. Because I am a self-directed learner, I assigned mostly individual projects to be completed by a certain date. These assignments were difficult for students who learned best in a group or with the help of an adult, or who needed encouragement, assistance, or prodding to finish a project. Furthermore, I didn't like gum chewing, foot tapping, or other extraneous movements or noise, yet I had students who needed those activities in order to learn

If a teacher teaches and evaluates in only one cognitive mode, he or she is adequately serving only those students who prefer to learn in that mode. To give every learner the opportunity to succeed, teachers can expand their repertoires to include a variety of cognitive modes. Teachers should also become aware of their own learning style preferences and of how those preferences affect their teaching methods. Yet another goal is to help students move from one preferred learning mode to a base of mixed preferences, so they can benefit from various instructional modes.

If we make these changes, we will improve our chances of success at educating a diverse student population.

Dunn, R., and K. Dunn. (1978). Teaching Students Through Their Individual Learning Styles: A

Sue Loper is Media Center Specialist, Moore County High School, Lynchburg, TN

From practical experience, educators generally consider the junior high school years a period of strong peer influence. By the beginning of grade 9, however, educators should expect movement away from that preference; Price (1980) found that students in grades 9-12 experience a greater need to learn and study alone than during any other interval. The gifted also prefer to learn alone unless the material to be mastered is difficult for them; when that happens, they prefer to learn with other gifted children (see fig. 3). Thus, except among the gifted, many students in grades 3-8 will learn better in small, well-organized groups than either alone or with the teacher. After grade 8, however, more will learn better alone.

In a small group structure, children who are frequently chastised for not sitting quietly can move about and Except among the gifted, many students in grades 3-8 will learn better in small. well-organized groups than either alone or with the teacher. After grade 8. however, more will learn better alone.

strengths often were conflicting because of inappropriate statistical designs, poor analyses, misinterpretations of the findings, and/or faulty conclusions. Those investigators examined group mean gain scores-which are inappropriate for determining whether individuals achieve better, the same, or less well in comparison with their own baseline data when they are taught through their preferences. In addition, the words tactile and kinesthetic often were used interchangeably. Tactile suggests learning with hands through manipulation of resources, but writing is not tactile enough for children below 4th grade. Kinesthetic implies wholebody involvement, such as taking a trip, dramatizing, interviewing, or pantomiming. However, even when older studies identified tactile strengths, their treatments did not introduce the new material that way. Finally, studies that employed many diverse instruments, populations, methods, and statistical designs and that confused the terminology could not yield solid data.

#### **On Sociological Preferences**

The influence of students' social preferences also affects their achievement in school. Figure 3 shows that, in four of five studies, when students' sociological preferences were identified and the youngsters then were taught in multiple treatments both responsive and unresponsive to their diagnosed learning styles, they achieved significantly higher test scores in matched conditions and significantly lower test scores when mismatched.

How do sociological preferences interface with cooperative learning? The higher the grade level, the less teacher-motivated students become (Price 1980). Thus, there are more peeroriented youngsters able to work in well-organized small groups than there are students willing to learn directly from their teachers. Nevertheless, in every class we have ever tested. there are students who prefer to learn by themselves with appropriate resources, others who prefer to learn with peers, and some who wish to work directly with their teachers (Price 1980).

relieve the discomfort they experience because of mobility needs or hard chairs. This structure also permits youngsters to read together, discuss items, reason out answers, and use multisensory interactions. The various contributors may enjoy different processing styles; thus, they can help each other, especially when the teacher's dominant hemispheric style is incongruent with theirs. Despite the advantages to group work, students who feel constrained by the slower group pacing or who enjoy the challenge of solving problems by themselves do not learn most easily through smallgroup instructional strategies, nor do they enjoy the experience.

#### Research on Time-of-Day Prefcrences

It is common knowledge that morning people and night owls function better at their respective times of day. The research supports our easy acceptance of these preferences. For example, two junior high school principals revealed that the math underachievers in both their schools preferred learning in the afternoon but had been scheduled into morning math classes. When those youngsters were rescheduled into afternoon classes, they evidenced higher motivation, better discipline, and an increase in achievement. Three years later, a New York high school reported that time preference was a crucial factor in the reversal of initial and chronic truancy patterns among

Researcher/Date	Sample	Subject Examined	
Cholakis 1986	106 underachieving, inner-city, parochial school 7th and 8th graders	Vocabulary development was provided through time strategies—by the teacher, alone by themselves, and in a peer group treatment.	
Findings: Those who pro However, all students at	derred learning alone, scored significantly higher (.01) than th tained significantly higher achievement (.001) and attitude (.	ose who preferred learning either with peers or the teacher. 01) scores when learning with an authority figure.	
DeBello 1985	236 suburban 8th graders	Students wrote social studies compositions and then experienced revision strategies that were congruent <i>and</i> incongruent with their sociological preferences.	
Findings: Peer learners of revising through the teac those who preferred to group achieved better the revision (.000). In addition they were assigned to a	cored significantly higher when matched with the peer-confi cher-conference, achieved statistically higher (01) than when n learn alone scored significantly higher (01) when matched, n han any other, but a significant interaction occurred betweer on, the attitudes of students who preferred to learn alone or pproaches that matched their styles.	erencing technique (01). Authority-oriented learners, when evising either through peer conferencing or self-review. And ather than mismatched, with self-review. No learning style individual sociological style and the matched method of with an adult were significantly more positive (01) when	
Giannitti 1988	104 suburban, parochial and public school 6th, 7th, and 8th graders	Social studies taught through both a mini-Contract Activity Package (CAP) and a small-group strategy, Team Learning	
Findings: Peer-oriented mini-Cap (01). Learning Non-preferenced studen A significant interaction	students achieved significantly higher test and attitudes scon alone preferents attained significantly higher test and attitue ts achieved better through the mini-Cap than through the Tea occurred between learning alone and peer-preferenced learnin	es when learning through Team Learning than through the le scores (.01) through the mini-Cap than with their peers. m Learning and liked working alone better than in groups. g and the method of learning (mini-Cap and Team Learning).	
Miles 1987	40 inner-city 5th and 6th graders	Twenty-two who preferred to learn alone and 18 who preferred to learn with peers were assigned randomly to two instructional groups that taught career awareness and career decision-making con- cepts in conditions both congruent and incon- gruent with their preferences.	
Findings: The matching (J01) and career decision and career decision-mak ment, neither sociologic individuals.	of sociological preference with complementary grouping patte making (J01). In addition, students' attitude scores were statis ing concepts (J05) in patterns accommodating their sociological ally preferenced group achieved better than the other but learni	rns increased achievement significantly on career awareness tically higher when they were taught career awareness (.01) preferences. With the exception of career awareness achieve- ng-alone preferents scored higher (.05) than peer-preferenced	
Perrin 1984	104 gifted and nongifted, suburban 1st and 2nd graders	Problem solving and word recognition through both individual- and peer-group strategies. Learn- ing with the teacher was eliminated as a strategy when not a single gifted child preferred to learn that way.	
Findings: Analysis of the proaches that matched grouped classes, a small gifted, actually perform	e mean gain scores revealed that achievement was significan their diagnosed sociological preferences. Although the gifter I group of seven gifted, who previously had known each othe ed best when learning in isolation with other gifted children	ly higher (.05) whenever students were taught through ap- d tended to prefer to learn alone in their heterogeneously er from participation in a special, part-time program for the n.	
	Fig. 3. Experimental Research Concerned with	Sociological Preferences	

secondary students (Dunn et al. 1987). Similar data were reported by the director of five alternative high schools in Washington (Dunn and Griggs 1988).

In 1983, the matching of elementary students' time preferences with their instructional schedules resulted in significant achievement gains in both reading and math over a two-year period. One year later, teachers' time preferences were identified, and staff development was conducted during their preferred and nonpreferred times (early morning and immediately after school). Interestingly, those teachers implemented innovative instructional techniques significantly more often (as reported by their supervisors' evaluations) when they were taught during their most preferred hours. Then an elementary school principal in Kansas administered the Iowa Basic Skills Tests in reading and math to groups whose time preferences matched their test schedules-either early morning or afternoon. She reported significantly higher test gains in both subjects as compared with each youngster's previous two years' growth (Dunn et al. 1987.)

Studies of dropouts, underachiev-

Most students are not morningalert.... Only about one-third of more than a million students we have tested prefer learning in the early morning, and the majority prefer late morning or afternoon. ers, at-risk (Griggs and Dunn 1988), and vocational education (Tappenden 1983) students indicate that, as a group, they are *not* morning people; neither were the truants in the New York experiment. For each of these groups, learning in late morning, afternoon, or evening significantly increased achievement.

Among the more interesting findings of research with time preferences is that most students are not morningalert. At the elementary school level, approximately 28 percent appear to be "early birds"; many do not begin to be capable of concentrating on difficult material until after 10:00 a.m., and many are at their best in the early afternoon. Only about one-third of more than a million students we have tested prefer learning in the early morning, and the majority prefer late morning or afternoon. At the high school level, almost 40 percent are early morning learners, but a majority remain most alert in the late morning and afternoon; and, for the first time identifiable after early childhood, almost 13 percent are "night owls," able to concentrate on difficult material in the evening (Price 1980). However, most teachers are early morning, highenergy people but often experience lows after 1:00 p.m. Another large group of educators merely get by much of the day and become mentally alert toward evening.

#### **Mobility Needs**

One element of learning style is the need for physical activity, and a review of this research reveals how this need



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can be confused with other, more alarming diagnoses. For example, Fadley and Hosler (1979) noted that children often were referred to psychologists because of their consistent hyperactivity; their teachers complained that such youngsters were unable to sit quietly and pay attention during lessons. Those psychologists reported that most students sent to them were not at all clinically hyperactive: instead, they were normal children in need of movement. In addition, the less interested they were in the lesson, the more mobility the children required.

During the same period, Restak (1979) substantiated that "over 95 percent of hyperactives are males" (p. 230) and that the very same characteristic, when observed in girls, correlated with academic achievement. He deplored that boys were required to be passive in school and were rejected for aggressive behaviors there, but were encouraged societally to engage in typical male aggressions in the world at large; this paradox could lead to role conflict. Restak added that conventional classroom environments did not provide male students with sufficient outlets for their normal needs. He warned that schools actually caused conflict with societal expectations that boys not be timid, passive, or conforming.

Other researchers corroborated Restak's admonitions and chastised educators for believing that physical activities prevented, rather than enhanced, learning. Indeed, when previously restless youngsters were reassigned to classes that did not require passivity, their behaviors were rarely noticed. Eventually, teachers began to report that although certain students thrived in activity-oriented environments that permitted mobility, others remained almost exclusively in the same area despite frequent attempts to coax them to move (Dunn et al. 1986). That led to Fitt's (1975) conclusions that no amount of persuasion increased certain children's interest in movement, whereas others found it impossible to remain seated passively for extended periods. "These are cases of a child's style ... governing his interaction with and within the environment" (p. 94).

DellaValle's (1984) research documented that almost half the 7th graders in a large urban racially mixed but predominantly black junior high school could not sit still for any length of time. Twenty-five percent could but only when interested in the lesson, and the remaining 25 percent preferred passivity. When preference and environment were matched, students' performance vielded significantly higher test scores than when they were mismatched. Figure 4 reports the post hoc analysis used to determine exactly where the interaction occurred. This analysis was conducted after the initial repeated measures design indicated a significant interaction at the .001 level.

#### **Everyone Has One**

Every person has a learning style-all have at least some preferences-the result of many influences. Certain learning style characteristics are biological, whereas others are developed through experience (Restak 1979. Thies 1979). Individual responses to sound, light, temperature, design, perception, intake, chronobiological highs and lows, mobility needs, and persistence appear to be biological; whereas sociological preferences, motivation, responsibility (conformity), and need for structure are thought to be developmental. The significant differences among diverse cultures tend to support this theory (Learning Styles Network Newsletter 1980-1988). Despite cultural influences, however, within each culture, socioeconomic



strata, and classroom there are as many within-group differences as betweengroup differences. Indeed, each family includes parents and offspring with styles that differ.

Those who suggest that children should learn to adapt to their teachers' styles disregard the biological nature of style. They also disregard Cafferty's (1980) findings that the closer the match between each student's and the teachers' styles, the higher the grade point average; and the reverse. In addition, Kagan (1966) reported that his "success" with training impulsive students to become more reflective was evidenced only when adults were present. In addition, although Kagan's subjects learned to respond more reflectively, their accuracy on tasks was decreased. Thus, educators can see that learning styles are not lightly held: they demonstrate remarkable resistance to change.

Identifying learning styles as a basis for providing responsive instruction has never been more important than now, as educators meet the needs of a diverse student population. To identify their students' learning styles (Beaty 1986, Dunn et al. 1977, Marcus 1977), teachers must use a reliable and valid learning style preference instrument (Curry 1987). When permitted to learn difficult academic information or skills through their identified preferences. children tend to achieve statistically higher test and attitude scores than when instruction is dissonant with their preferences

No learning style is either better or worse than another. Since each style has similar intelligence ranges, a student *cannot* be labeled or stigmatized by having any type of style. Most children can master the same content; *bow* they master it is determined by their individual styles.

 When we use the terms significant and significantly, we mean in a statistical sense.

Authors' note: Space limitations required the reduction from 163 primary references to the following list.

#### References

- Armotated Bibliography. (1988). New York: Center for the Study of Learning and Teaching Styles, St. John's University.
- Beaty, S.A. (1986). "The Effect of Inservice Training on the Ability of Teachers to Observe Learning Styles of Students." Doctoral diss., Oregon State University. *Dissertation Abstracts International* 47: 1998A.
- Brugo, J. (1988). "An Experimental Investigation of the Relationships Between and Among Hemispheric Processing, Learning Style Preferences, Instructional Strategies, Academic Achievement, and Attitudes of Developmental Mathematics Students in an Urban Technical College." Doctoral diss., St. John's University.
- Cafferty, E. (1980). "An Analysis of Student Performance Based Upon the Degree of Match Between the Educational Cognitive Style of the Teachers and the Educational Cognitive Style of the Students." Doctoral diss., University of Nebraska.
- Carbo, M. (1980). "An Analysis of the Relationship Between the Modality Preferences of Kindergartners and Selected Reading Treatments as They Affect the Learning of a Basic Sight-Word Vocabulary." Doctoral diss., St. John's University, New York. *Dissertation Abstracts International* 41: 1389A.
- Cholakis, M. M. (1986). "An Experimental Investigation of the Relationships Between and Among Sociological Preferences, Vocabulary Instruction and Achievement, and the Attitudes of New York, Urban Seventh and Eighth Grade Underachievers." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 47: 4046A.
- Cody, C. (1983). "Learning Styles, Including Hemispheric Dominance: A Comparative Study of Average, Gifted, and Highly Gifted Students in Grades Five

Through Twelve. Doctoral diss., Temple University. *Dissertation Abstracts International* 44: 1631-6A.

- Curry, L. (1987). Integrating Concepts of Cognitive Learning Style: A Review with Attention to Psychometric Standards. Ontario, Canada: Canadian College of Health Service Executives.
- DeBello, T. (1985). "A Critical Analysis of the Achievement and Attitude Effects of Administrative Assignments to Social Studies Writing Instruction Based on Identified Eighth Grade Students' Learning Style Preferences for Learning Alone, with Peers, or with Teachers." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 47: 68A.
- DeGregoris, C. N. (1986). "Reading Comprehension and the Interaction of Individual Sound Preferences and Varied Auditory Distractions." Doctoral diss., Hofstra University, Dissertation Abstracts International 47: 3380A.
- DellaValle, J. (1984). "An Experimental Investigation of the Word Recognition Scores of Seventh Grade Students to Provide Supervisory and A<sup>rd</sup>ministrative Guidelines for the Organization of Effective Instructional Environments." Doctoral diss., St. John's University. Dissertation Abstracts International 45: 359-02A.
- Dunn, R. (1987). "Research on Instructional Environments: Implications for Student Achievement and Attitudes." *Professional School Psychology* 11, 2: 43-52.
- Dunn, R. (1988). "Commentary: Teaching Students Through Their Perceptual Strengths or Preferences." *Journal of Reading* 31, 4: 304-309.
- Dunn, R., D. Cavanaugh, B. Eberle, and R. Zenhausern. (1982). "Hemispheric Preference: The Newest Element of Learning Style." *The American Biology Teacher* 44, 5: 291-294.
- Dunn, R., J. DellaValle, K. Dunn, G. Geisert, R. Sinatra, and R. Zenhausern. (1986). "The Effects of Matching and Mismatching Students' Mobility Preferences on Recognition and Memory Tasks." *Journal of Educational Research* 79, 5: 267-272.
- Dunn, R., K. Dunn, and G. E. Price. (1975, 1979, 1981, 1985). *Learning Style Inventory*. Price Systems, Box 1818, Lawrence, KS 66044-0067.
- Dunn, R., K. Dunn, and G.E. Price. (1977). "Diagnosing Learning Styles: A Prescription for Avoiding Malpractice Suits Against School Systems." *Pbi Delta Kappan* 58, 5: 418-420.

- Dunn, R., K. Dunn, L. Primavera, R. Sinatra, and J. Virostko. (1987). "A Timely Solution: A Review of Research on the Effects of Chronobiology on Children's Achievement and Behavior." *The Clearing House* 61, 1: 5-8 (Heldreff Publications, Washington, D.C.).
- Dunn, R., and S.A. Griggs. (1988). Learning Style: Quiet Revolution in American Secondary Schools. Reston, Va.: National Association of Secondary School Principals.
- Dunn, R., J. Krimsky, J. Murray, and P. Quinn. (1985). "Light Up Their Lives: A Review of Research on the Effects of Lighting on Children's Achievement." *The Reading Teacher* 38, 9: 863-869 (The International Reading Association, Newark, Delaware).
- Fadley, J.L., and V.N. Hosler. (1979). Understanding the Alpha Child at Home and at School. Springfield, Ill.: Charles C Thomas.
- Fitt, S. (1975). "The Individual and His Environment." In *Learning Environments*, edited by T.G. David and B.D. Wright. Chigago: University of Chicago Press.
- Giannitti, M. C. (1988). "An Experimental Investigation of the Relationships Among the Learning Style Sociological Preferences of Middle-School Students (Grades 6, 7, 8), Their Attitudes and Achievement in Social Studies, and Selected Instructional Strategies." Doctoral diss., St. John's University, New York.
- Griggs, S.A., and R. Dunn. (September/ October 1988). "High School Dropouts: Do They Learn Differently from Those Who Remain in School?" *The Principal* 35, 1: 1-8 (Board of Jewish Education of Greater New York).
- Hill, J., et al. (1971). Personalized Education Programs Utilizing Cognitive Style Mapping. Bloomfield Hills, Mich.: Oakland Community College.
- Hodges, H. (1985). "An Analysis of the Relationships Among Preferences for a Formal/Informal Design, One Element of Learning Style, Academic Achievement, and Attitudes of Seventh and Eighth Grade Students in Remedial Mathematics Classes in a New York City Junior High School." Doctoral diss, St. John's University, New York. Dissertation Abstracts International 45: 2791A.
- Jarsonbeck, S. (1984). "The Effects of a Right-Brain and Mathematics Curriculum on Low Achieving Fourth Grade Students." Doctoral diss., University of South Florida. Dissertation Abstracts Intern.ational 45: 2791A.

- Kagan, J. (1966). "Reflection-Impulsivity: The Generality and Dynamics of Conceptual Tempo." *Journal of Abnormal Psychology* 71: 17-24.
- Keefe, J., M. Languis, C. Letteri, and R. Dunn. (1986). *Learning Style Profile*. Reston, Va.: National Association of Secondary School Principals.
- Krimsky, J. (1982). "A Comparative Analysis of the Effects of Matching and Mismatching Fourth Grade Students with Their Learning Style Preference for the Environmental Element of Light and Their Subsequent Reading Speed and Accuracy Scores." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 43: 66A.
- Kroon, D. (1985). "An Experimental Investigation of the Effects on Academic Achievement and the Resultant Administrative Implications of Instruction Congruent and Incongruent with Secondary Industrial Arts Students' Learning Style Perceptual Preference." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 46: 3247A.
- Learning Styles Network Newsletter. (Winter 1980-Autumn 1988). New York: National Association of Secondary School Principals and St. John's University.
- MacMurren, H. (1985). "A Comparative Study of the Effects of Matching and Mismatching Sixth-Grade Students with Their Learning Style Preferences for the Physical Element of Intake and Their Subsequent Reading Speed and Accuracy Scores and Attitudes." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 46: 3247A.
- Marcus, L. (1977). "How Teachers View Learning Styles." NASSP Bulletin 61, 408: 112-114.
- Martini, M. (1986). "An Analysis of the Relationships Between and Among Computer-Assisted Instruction, Learning Style Perceptual Preferences, Attitudes, and the Science Achievement of Seventh Grade Students in a Suburban New York School District." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 47: 877A.
- Miles, B. (1987). "An Investigation of the Relationships Among the Learning Style Sociological Preferences of Fifth and Sixth Grade Students, Selected Interactive Classroom Patterns, and Achievement in Career Awareness and Career Decision-Making Concepts." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 48: 2527A.

- Miller, L. M. (1985). "Mobility as an Element of Learning Style: The Effect Its Inclusion or Exclusion Has on Student Performance in the Standardized Testing Environment." Master's thesis, University of North Florida.
- Murrain, P. G. (1983). "Administrative Determinations Concerning Facilities Utilization and Instructional Grouping: An Analysis of the Relationships Between Selected Thermal Environments and Preferences for Temperature, an Element of Learning Style, as They Affect Word Recognition Scores of Secondary Students." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 44: 1749A.
- NASSP National Task Force. (Summer 1983). "National Task Force Defines Learning Style Operationally and Conceptually." Learning Styles Network Newsletter 4, 2: 1 (National Association of Secondary School Principals and St. John's University).
- Perrin, J. (1984). "An Experimental Investigation of the Relationships Among the Learning Style Sociological Preferences of Gifted and Non-Gifted Primary Chil-

dren, Selected Instructional Strategies, Attitudes, and Achievement in Problem Solving and Rote Memorization." Doctoral diss., St. John's University, New York Dissertation Abstracts International 46: 342A.

- Pizzo, I. (1981). "An Investigation of the Relationships Between Selected Acoustic Environments and Sound, an Element of Learning Style, as They Affect Sixth Grade Students' Reading Achievement and Attitudes." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 42: 2475A.
- Price, G.E. (1980). "Which Learning Style Elements are Stable and Which Tend to Change Over Time?" Learning Styles Network Newsletter 1, 3: 1.
- Restak, R. (1979). The Brain: The Last Frontier. New York: Doubleday.
- Shea, T. C. (1983). "An Investigation of the Relationship Among Preferences for the Learning Style Element of Design, Selected Instructional Environments, and Reading Achievement with Ninth Grade Students to Improve Administrative Determinations Concerning Effective Educational Facilities." Doctoral diss., St.

John's University, New York. Dissertation Abstracts International 44: 2004A.

- Stiles, R. (1985). "Learning Style Preferences for Design and Their Relationship to Standardized Test Results." Doctoral diss., University of Tennessee, Dissertation Abstracts International 46: 2551A
- Tappenden, V. J. (1983). "Analysis of the Learning Styles of Vocational Education and Nonvocational Education Students in Eleventh and Twelfth Grades from Rural, Urban, and Suburban Locations in Ohio." Doctoral diss., Kent State University. Dissertation Abstracts International 44: 1326a.
- Thies, A.P. (1979). "A Brain-Behavior Analvsis of Learning Style." In Student Learning Styles: Diagnosing and Prescribing Programs. Reston, Va.: National Association of Secondary School Principals, pp. 55-61.
- Urbschat, K. S. (1977). "A Study of Preferred Learning Models and Their Relationship to the Amount of Recall of CVC Trigrams." Doctoral diss., St. John's University, New York, Dissertation Abstracts International 38: 2536-5A
- Weinberg, F. (1983). "An Experimental Investigation of the Interaction Between Sensory Modality Preference and Mode of Presentation in the Instruction of Arithmetic Concepts to Third Grade Underachievers." Doctoral diss., St. John's University, New York. Dissertation Abstracts International 44: 1740A.
- Wheeler, R. (1980). "An Alternative to Failure: Teaching Reading According to Students' Perceptual Strengths." Карра Delta Pi Record 17, 2: 59-63.
- Wheeler, R. (1983). "An Investigation of the Degree of Academic Achievement Evidenced When Second Grade Learning Disabled Students' Perceptual Preferences Are Matched and Mismatched with Complementary Sensory Approaches to Beginning Reading Instruction." Doctoral diss., St. John's University, New York Dissertation Abstracts International 44: 2039A.

Rita Dunn is Professor, Division of Administrative and Instructional Leadership, and Director, Center for the Study of Learning and Teaching Styles; Jeffrey S. Beaudry is Assistant Professor, Division of Administrative and Instructional Leadership; and Angela Klavas is Assistant Director, Center for the Study of Learning and Teaching Styles, and a doctoral student in the Instructional Leadership Programall at St. John's University, Grand Central and Utopia Parkways, Jamaica, NY 11439.

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